



# Northwest Fisheries Science Center 2012 Year in Review



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The Northwest Fisheries Science Center (NWFSC) conducts research to help conserve and manage living marine resources and their habitats in the Pacific Northwest. This document provides some highlights of the work we completed in 2012, organized by our primary areas of emphasis: ecosystem approaches, rebuilding and sustaining species, conserving habitats, and ensuring sustainable and safe seafood.

### Science to Support an Ecosystem Approach to Management for the West Coast

*The California Current Large Marine Ecosystem, which includes Puget Sound, the Columbia River Basin, and coastal watersheds, is home to a wide range of freshwater and marine resources that provide a wealth of ecosystem goods and services. Our work in 2012 focused on understanding ecosystem structure, function, and vulnerability to increased human population growth in coastal communities, and competing uses of coastal waterways and oceans.*

#### Characterized public views of environmental management in Puget Sound

We surveyed 1,980 Puget Sound residents for their views on how policies might benefit their community. There was broad support for various environmental interventions that could guide a scientific framework to set ecosystem management targets in collaboration with the Puget Sound Partnership.

#### Completed the next-generation biennial Integrated Ecosystem Assessment for the California Current

Along with the Southwest Fisheries Science Center (SWFSC), we assessed the status, trends, and risks to key components of the California Current ecosystem, including marine mammals, Pacific salmon, coastal pelagic fishes, groundfish, seabirds, overall ecological integrity, and the well being of coastal communities. Trade-offs to each component under likely scenarios of population growth, climate change, or increasing conservation demands were also examined.

### Rebuilding and sustainability of marine and anadromous species

*The Pacific Northwest is home to iconic endangered species, including Pacific salmon, killer whales, and rockfish. The NWFSC provides scientific research, monitoring, and analysis information to NOAA managers and regional stakeholders for crafting regulations and recovery plans for depleted species and stocks.*

#### Enhanced captive broodstock gene rescue programs for listed salmon

We raised over 450 adults and 140,000 progeny to help rebuild genetic populations of threatened North Puget Sound Chinook salmon and endangered Snake River sockeye salmon. We also co-authored major publications outlining the needs for both hatchery reform and best management practices for captive broodstock gene rescue programs.

#### Developed new genetic tools to assess fish diversity

We are using tens of thousands of genetic markers to identify the genes responsible for differences in reproductive success between hatchery and wild fish. These data are being used in collaboration with state and tribal partners to look at differences within and between salmon populations.

### **Integrated new data collection technologies into fisheries passage studies**

We collaborated with Real Time Research, Inc. to develop a touch-screen data entry system, an efficient solution to improve the collection and analysis of information about salmon passing the Snake River's Lower Granite Dam.

### **Conducted first ever joint Pacific hake/sardine survey**

In response to industry needs, we completed the first ever joint Pacific hake/sardine survey. This collaborative effort involved the NWFSC, SWFSC, the Canadian Department of Fisheries and Oceans (DFO), and the hake industry. Despite significant challenges, the survey was a success and is a model for future mixed fishery surveys that effectively uses available ship time with beneficial cost efficiencies.

### **Evaluated effects of salmon fisheries on killer whales**

We collaborated with the Canadian DFO and others to analyze the effects of salmon fishing on endangered killer whales, which led to the development of a software tool to help managers identify killer whale life stages that may be most sensitive to changes in salmon abundance.

### **Integrated acoustic technology with wave glider instrument to research marine life**

NWFSC scientists took an acoustic tool commonly used in fishery surveys, an echosounder, and added it to the Wave Glider, an unmanned submersible propelled by ocean waves. This new, integrated technology is being tested as a low-cost method for researching marine life and in conducting fisheries surveys.



### **Habitats to support fisheries and recovered populations**

*Healthy oceans, coastal waters, and riverine habitats provide the foundation for aquatic resources used by a diversity of species and society. The NWFSC provides the habitat science behind many management actions to protect and recover these resources.*

### **Monitored re-colonization of fish following Elwha Dams removal**

Following removal of the Elwha River dams, NWFSC biologists tagged and transplanted fish upstream of the dams to help “jump-start” fish recolonization in newly accessible habitat, and continue to monitor recolonization efforts. Salmon and steelhead are now spawning in a free-flowing stretch of the Elwha River for the first time in over a century.

### **Published comprehensive guide for habitat restoration**

NWFSC's watershed scientists published a comprehensive technical guide and textbook on stream and watershed restoration for students and practitioners. The publication, “Stream and Watershed Restoration: A Guide to Restoring Riverine Processes and Habitats,” takes a comprehensive look at restoration science with a broad perspective on the effectiveness of habitat restoration actions.

### **Improved understanding of essential fish habitat for Pacific Coast Groundfish**

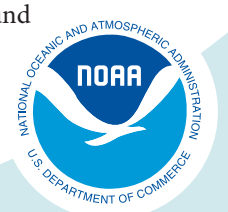
NWFSC scientists worked with the Pacific Fishery Management Council to complete an online data catalog of the essential fish habitat (EFH) for 91 groundfish species, updated a coast-wide habitat map, and identified the potential threats to groundfish EFH and prey species from fishing and non-fishing activities. This data is being further analyzed to support Council review of EFH.

### **Restoring habitat in a changing climate**

We co-authored a new paper to help managers adapt salmon habitat restoration strategies to a changing climate. The paper, entitled “Restoring Salmon Habitat for a Changing Climate,” provides a decision-support framework, guiding questions, and maps with local habitat considerations.

### **Released first annual report of marine water conditions in Puget Sound**

We led the production of the first comprehensive review for the marine waters of Puget Sound, a collaborative report developed for the Puget Sound Ecosystem Monitoring Program's Marine Waters Workgroup and the Puget Sound Partnership. The report provides a collective snapshot of local marine water conditions, adding to our understanding of the complex Puget Sound ecosystem.



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## Sustainable, Safe and Secure Seafood for Healthy Populations and Vibrant Communities

*Effective fisheries management provides economic opportunities and ensures the long-term sustainability of fisheries and the habitats on which they depend. The NWFSC seeks to improve data collection and analysis for assessing stocks and ecosystem structure and function, as well as providing state-of-the-art science and technology to support sustainable aquaculture. The NWFSC also investigates natural and anthropogenic stressors of marine ecosystems that pose significant risks to health of both seafood resources and to humans.*

### Improved understanding of premature die-offs in coho salmon

We completed a large, multi-year investigation into the causes and consequences of coho salmon die-offs in Puget Sound urban streams. Scientists found that urbanized stormwater runoff contains one or more unidentified compounds that are highly toxic to the species, degrading the water quality needed to support healthy populations.

### Completed seafood safety project in developing nations

Through the North Pacific Marine Science Organization (PICES), we developed a community-based phytoplankton-monitoring network and trained personnel to conduct rapid toxin analysis in Indonesia, Guatemala, and the Philippines-- countries that are at a greater risk of human illness and death through unregulated shellfish consumption during toxic events. In addition, improved monitoring would increase the safety of exported seafood.

### Provided science informing Court settlement on *Cosco Busan* oil spill

Experiments and monitoring conducted by Center scientists in the aftermath of the *Cosco Busan* oil spill in San Francisco Bay informed the 2012 Federal District court decision to approve a \$44 million settlement with the ship owners for natural resource damages and penalties. This is the largest oil spill settlement for a Federal trustee since passage of the Oil Pollution Act.

### Improved abundance estimates for groundfish

We developed a new software tool for improving conversion of raw data from trawl surveys into abundance estimates for stock assessment models. The new models are more realistic and run as much as 50 times faster than existing methods. Scientists tested the models on 32 species of marine fish, and a subset of these analyses has been submitted for a peer-reviewed publication.

### Estimated economic impacts of groundfish management alternatives

For the first time, we completed an assessment of the economic impact on each port group in the Pacific Coast Groundfish Fishery of choosing different alternatives proposed for managing the fishery by the Pacific Fishery Management Council.

### Detected migration patterns in tuna after Fukushima reactor disaster

Trace amounts of radiation originating from Japan's 2011 tsunami were found in samples of Pacific albacore caught on the West Coast. While these levels are far below thresholds that would pose a risk to seafood consumers, these measurements allowed us to track for the first time the migratory patterns in albacore tuna that visit the West Coast.

### Tested new technology to help shellfish and fish farmers

We tested a new biosensor able to detect the DNA of microscopic species that cause harmful algal blooms. The Environmental Sample Processor was deployed in Puget Sound for the first time and gave scientists an early warning of a bloom of *Heterosigma akashiwo*, a fish-killing alga. This information was rapidly disseminated to businesses, triggering increased surveillance at fish farms throughout Puget Sound and British Columbia.

## Research Infrastructure and Support

*In order to conduct state-of-the-art science, we are dependent on staff that provides a range of critical support services from data management, budget, safety, small boat operations, and communications, to IT, strategic planning, and facilities maintenance.*

### Completed NWFSC Science Strategic Plan

As part of an agency-wide effort, we made a major revision of our 5-year strategic science plan, which outlines what we will do to meet our agency's mission. The plan was reviewed by key partners, stakeholders, and the public, and will be used in guiding development of annual implementation plans and in agency science planning processes.

### Implemented NOAA Fisheries Data Documentation Directive

The NWFSC's Science Data Documentation team successfully completed publication of "discovery" level metadata for current and ongoing science projects to help make NOAA Fisheries data transparent to other researchers and the public.

### Featured NWFSC science at outreach and education events

We hosted the 3rd Biennial NWFSC Science Symposium and participated in community events and outreach activities, including the inaugural Seattle Science Festival and NOAA Science Camp, which was successful in demonstrating the value of NOAA science to a wide audience.

### Received Presidential Award for "green" practices

The NWFSC Center won a Presidential Award for our community-based recycling program, which diverted 1,400 pounds

of batteries from landfill and collected enough food waste to make 6,400 pounds of compost, significantly reducing our carbon footprint.

